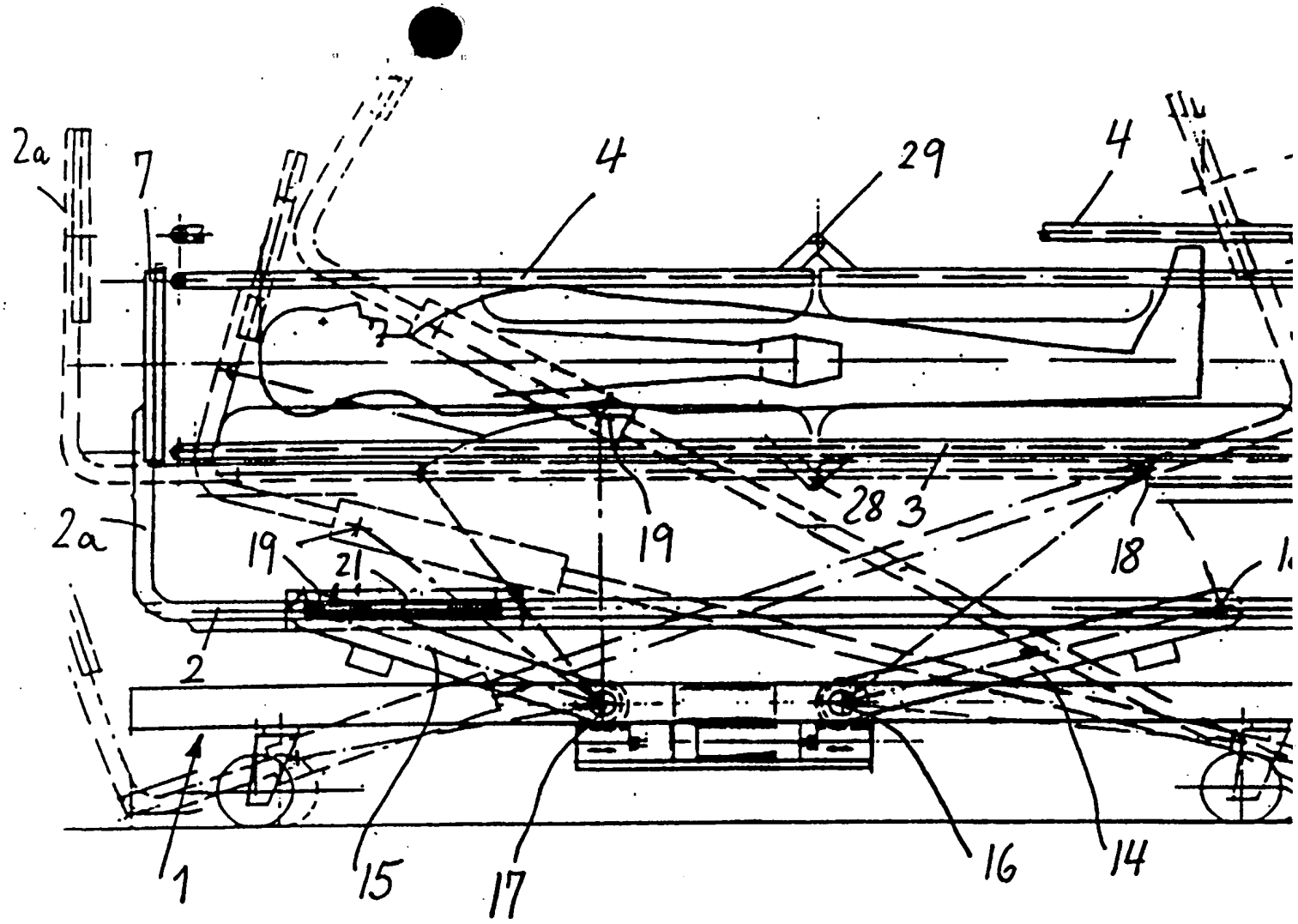
TITLE - Swivel bed with height adjustable frame.

ABSTRACT - DE4429062 A

A height-adjustable supporting frame (2) is mounted on a trolley base(1) and is U-shaped with two legs (2a,b) each carrying a rotary disc (7,8) so their aligned axes (9) form the mattress frame (3) pivot axis (5). The discs mount vertically superposed lying frames (3,4) which can each be lowered by turning the discs so the upper frame (4) takes the patient face downwards and bottom frame (3) takes the patient on his/her back. Both frames are hinged at their foot ends to the discs so as to swing up round horizontal axes into an arrestable horizontal position, using arresters on one disc for the two frames plus a central opening for service lines to the patient.

- The supporting frame can be swung round an horizontal cross axis to raise or lower the head of the patient as required, using an hydraulic device (14-20) to vary the height of the frame (2), eg. double rocker and linkage system (14-19), powered by two pumps whose racks are engaged by the pinion of a torsion shaft positively joined to one end of the rocker (14,15).
- ADVANTAGE - The swivel bed unit switches ventilated patients easily from back to stomach positions with minimum patient trauma or physical exertion by attendants. (Dwg.2/9)


2a
7
4
29
4
2a
19
21
19
28
3
18
2
1
15
17
16
14

Commencing column 4, line 16:

According to Fig. 1, the hospital bed represented consists essentially of a chassis frame 1, on which a carrying frame 2, which in side view has a flat U shape, is suspended in such a way that its height can be adjusted and which carries between its sides 2a, 2b, two horizontal frames 3, 4, that are vertically separated one above the other, which can be brought into a lower functional position by rotation about a longitudinal axis 5, so that in one position of the horizontal frame, the patient is lying face-up and in the other position of the horizontal frame, the patient is lying face-down. In the representations in Fig. 1, the mattress frame 3 is shown in its lower functional position, supporting the back of the patient. Further, the illustrations c) to e) show that the carrying frame 2 can be raised vertically and then, optionally, tilted into a head-down or feet-down position by means of a lifting and rotating device, not illustrated in the figure 1. Figures 2 and 3 reveal further details of the hospital bed. It is seen that the two arms 2a, 2b, of the U-shaped frame 2 are formed by roof-like struts 6, to each pair of which a disk is fitted 7 and 8 and provided with a means of rotation, in which the rotatable disks 7, 8 share a common axis of rotation 9. According to Fig. 8, both rotatable disks 7,8 are guided on their outer circumference in a ball bearing 10. Moreover, at least one rotatable disk 8 has two detents 11, 12 arranged approximately 180 degrees apart around the circumference, in which a manually released latching device 13 can engage (see Fig. 8). The two detents 11, 12 are assigned to the two functional positions of the horizontal frames 3, 4.

An hydraulic lifting and rotating device, shown merely in diagrammatic form in Fig. 2, is provided for the actuation of the carrying frame 2. This device actuates a quadrilateral linkage 16, 17, 18, 19, incorporating the compensating levers 14, 15. The lifting and rotating device preferably has two hydraulic cylinders, preferably foot-actuated by means of pedals 20, that are shown schematically in Fig. 3. When the named device is actuated, it operates a toothed rack that is in mesh with a gear wheel that is rigidly fixed on a torsion shaft that, in turn, is rigidly connected to one end of the two

levers 14, 15, respectively. These two torsion rods form the pivot points 16, 17 of the quadrilateral linkage shown in Fig. 2. The other end of the longer link 14 is pivoted on a longitudinal spar of the carrying frame 2, via pivot point 18, whilst the other end of the shorter link 15 is guided in a longitudinal slot 21 in the longitudinal spar of the carrying frame 2, at the sliding trunnion formed at pivot point 19. If both levers 14, 15 are swung upwards in opposite directions of rotation about the pivot points 16, 17, then the carrying frame 2 is raised parallel to its original position, with a slight longitudinal displacement, as can be seen from the dashed lines in Fig. 2. If, in Fig. 2, both levers 14, 15 are rotated in a clockwise sense, then the carrying frame 2 is displaced about a transverse axis into a 'feet-down' position. An anti-clockwise rotation of the levers 14, 15, leads to a displacement of the carrying frame 2 about a horizontal transverse axis, into a 'head-down' position, as shown by the dashed lines in Fig. 2.

According to Fig. 3, there is an included acute angle α to the horizontal, with the horizontal frames 3, 4 in the upper position, when viewed from the front, so that the vertical separation between the two horizontal frames 3, 4 is less on one longitudinal side (the right hand side in Fig. 3) than on the other longitudinal side. The rotatable disks 7, 8 that support the two carrying frames 3, 4, can be rotated through a maximum angle of 180° and only in a direction towards the apex of the angle formed between the two carrying frames. By this means it is ensured that the patient does not tend to be tilted towards the point of greatest separation between the two carrying frames 3, 4, during rotation about the longitudinal axis 5. The aforementioned angle α is approx. 15°. A stop is provided to limit the rotational motion. Each rotatable disk 7, 8 carries on its inner side two vertical, mutually opposed spindles 22 on a disk radius, on which the two carrying frames 3,4 are fixed, such that the foot ends of each are pivoted and the head ends of each are detachable. Fig. 6 shows the detail of the foot end of a carrying frame 3, 4 that is fixed to the allocated spindle 22 on the foot-end rotatable disk 8 via a pivot bearing 23 with a horizontal transverse axis. Displacement of the spindle 22 enables the height setting of the pivot bearing 23 to be varied in relation to the axis of rotation 9 of the rotatable disks 7, 8, in the sense of the arrows shown.

It can be seen from Fig. 7, that the head end of each carrying frame 3,4 is fixed, in such a way that it can be detached, to a support on the spindle 22, by means of a

clamping screw 25, that can be swivelled away from engagement about an axis 24, in which here also the height of the frame fixing can be adjusted in relation to the axis of rotation 9, or longitudinal bed axis 5, by rotating the spindles 22.

In particular, it can be seen from Fig. 9, that the lying surface of the prone position frame 4 is shortened in relation to the fully-formed lying surface of the mattress frame 3 and features a head area terminating approximately at the shoulder position of the patient. A mounting 26 for a soft elastic headrest 27 is provided on the prone position frame 4 in this head area. The headrest 27, which rests on angled cranks, can be adjusted to the vertical position by means of a thrust link, not illustrated in detail in the figure.

In particular, it can be seen from Fig. 2, that both carrying frames 3, 4 are divided laterally, approximately in the middle and provided with link hinges 29, 28 (see also the prone position frame 4 in Fig. 9).

Both rotatable disks 7, 8 have a central cut-out 30 to provide access for various supply lines to the patient that are not detailed. According to Fig. 4 and Fig. 5, a pulley 31 can be mounted in the central cut-out 30 in the head end rotatable disk 7, in the central longitudinal plane of the bed, over which an extension cord 32 is suspended, being loaded with a weight and attached to a Crutchfield clamp, which is not illustrated. This pulley 31 is attached to a support tube 33, fixed to the outside of the rotatable disk 7, by means of which its height can be adjusted. As shown in Fig. 5, in the example represented, an arm 34, coupled to the upper end of the vertical support tube 33 can be rotated in the anti-clockwise direction from its horizontal functional position, to the inoperative position indicated by the dashed lines. It can be further seen, from Fig. 4, that at the head end, vertical support rods 35 are mounted on each side of the rotatable disk 7, on the struts 6 of the carrying frame 2, to support medical infusion or similar equipment that is not illustrated. Also at the head end, an electrical distribution box 37 can be mounted on a transverse beam 36 of the carrying frame 2.